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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/716,347	11/18/2003	Anand Jagota	CL2317USNA	7610

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E I DU PONT DE NEMOURS AND COMPANY
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4417 LANCASTER PIKE
WILMINGTON, DE 19805

EXAMINER

WATTS, ALLISON LEIGH

ART UNIT	PAPER NUMBER
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1753

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/716,347

Applicant(s)

JAGOTA ET AL.

Examiner

Allison L. Watts

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.138(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 18 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 4-10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 11-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date See Continuation Sheet.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

Continuation of Attachment(s) 3. Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date : 1/26/2005, 8/31/2004, and 4/6/2004.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-3 and 11-19, drawn to a method, classified in class 204, subclass 456.
 - II. Claims 4-5 and 11-19, drawn to a method, classified in class 536, subclass 25.4.
 - III. Claims 6-11 and 13-19, drawn to a method, classified in class 210, subclass 634.
2. Inventions Group I, Group II and Group III are directed to related methods. The related inventions are distinct if the (1) the inventions as claimed are either not capable of use together or can have a materially different design, mode of operation, function, or effect; (2) the inventions do not overlap in scope, i.e., are mutually exclusive; and (3) the inventions as claimed are not obvious variants. See MPEP § 806.05(j). In the instant case, the inventions as claimed cannot be used together and have different modes of operation. Furthermore, the inventions as claimed do not encompass overlapping subject matter and there is nothing of record to show them to be obvious variants.
3. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

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4. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

5. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art due to their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

6. A telephone call was made to Neil Feltham on February 9, 2007 to request an oral election to the above restriction requirement, but did not result in an election being made.

7. During a telephone conversation with Neil Feltham on February 9, 2007 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-3 and 11-19. Affirmation of this election must be made by applicant in replying to this Office action. Claims 4-10 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 1 –3 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Papadimitrakopoulos in combination with Dai et al, and in view of Rakestraw.

As to claims 1 –3, 11 and 14 Papadimitrakopoulos disclose a method of separation of a population of carbon nanotubes comprising providing a complex

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consisting of a carbon nanotube non-covalently bonded to a functional group in a solution and separating the complex solution by size using electrophoresis gel (column 4, lines 20-24; column 7, lines 54-56; claims 1-3 and 10).

Papadimitrakopoulos does not disclose nucleic acid bonded to the carbon nanotube.

Dai et al. disclose non-covalently bonded DNA molecules absorbed onto the surface of a carbon nanotube (claims 1 and 13).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the unfunctionalized carbon nanotube-nucleic acid complex of Dai et al. for the carbon nanotube complex of Papadimitrakopoulos because the purpose of the functional group attached to the carbon nanotube in the invention of Papadimitrakopoulos is to separate the carbon nanotubes using electrophoresis, and it is well known in the art that DNA is able to be separated by electrophoresis as well.

Papadimitrakopoulos does disclose using electrophoresis to separate the carbon nanotubes, but does not specifically disclose using gel electrophoresis, or a densifying agent.

Rakestraw discloses using agarose gel electrophoresis to separate DNA and using a densifying agent, such as Ficoll or sucrose, to help prepare the DNA for loading onto the gel (column 6, lines 9-22).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the gel electrophoresis of Rakestraw for the electrophoresis of Papadimitrakopoulos because gel electrophoresis is a common

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method used for separating DNA based on size. It would also have been obvious to utilize the densifying agent of Rakestraw because it would assist in loading the carbon nanotube-nucleic acid complex solution onto the gel.

As to Claims 12 and 13, Dai et al. does not disclose the nucleic acid in the carbon nanotube-nucleic acid complex comprising nucleic acid of a specific size range, or comprising specific bases.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize nucleic acid molecules of varying sizes for the carbon nanotube-nucleic acid complex disclosed by Dai et al. and separating the carbon nanotubes by electrophoresis as disclosed by Papadimitrakopoulos because it is known in the art of electrophoresis that nucleic acids are separated during electrophoresis based on size, and separating the nucleic acids allows for separation of the carbon nanotubes.

12. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Papadimitrakopoulos, Dai et al, and Rakestraw in view of Awano.

As to Claims 15, 16, and 18 Papadimitrakopoulos does not disclose the nanotubes having a uniform diameter and chirality and being uniformly semiconducting.

Awano disclose the nanotubes having a uniform diameter and chirality and being uniformly semiconducting (paragraphs 0003-0004, 0011, and 0028-0029).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the carbon nanotubes of Awano for the carbon nanotubes of Papadimitrakopoulos because carbon nanotubes displaying the characteristics of

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uniform diameter and chirality and uniformly semiconducting are useful in various fields, such as electrical applications.

13. Claims 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Papadimitrakopoulos, Dai et al, Rakestraw, and Awano in view of Rinzler et al.

As to Claims 17 and 19, Papadimitrakopoulos does not disclose the nanotubes being uniformly metallic.

Rinzler et al. disclose the nanotubes being metallic and useful for applications requiring good conductivity (paragraph 0006).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the metallic carbon nanotubes of Rinzler et al. for the carbon nanotubes of Papadimitrakopoulos because metallic carbon nanotubes could be useful in applications requiring good conductivity, as well as uniform conductivity, as disclosed by Awano.

Conclusion

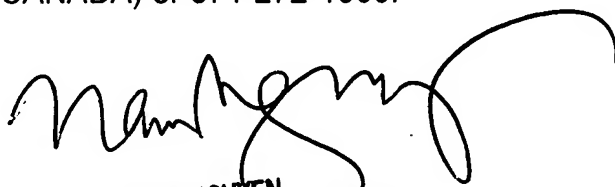
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allison L. Watts whose telephone number is (571) 272-6640. The examiner can normally be reached on Monday through Friday, 9:00 am to 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ALW
2/16/2007



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